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BOTANY REFERENCE NOTES

Paper – I

Plant Resource Development – II

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BOTANY REFERENCE NOTES

Paper – I

Plant Resource Development: Part – II

Topics Covered

Plants as sources for food, fodder, fibre, spices, beverages, edible oils, drugs, narcotics, insecticides, timber, gums, resins and dyes, latex, cellulose, starch and its products, Perfumery

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WOOD

Technically speaking 'wood' includes secondary xylem elements formed as a result of secondary growth in the stem. Angiospermic wood comprises four components, namely the tracheids, vessels, fibres and parenchyma. On the other hand gymnospermic wood lacks vessels and, hence, is called non-porous as against 'porous' of angiosperms.

* The structural arrangement of various wood components is called 'grain' of wood.
* The relative size and quality of various wood elements is called texture of wood.
* The design and pattern that appears on the surface of wood is known as the figure of wood.

* Strength : Ability of wood to resist certain forces like tension, shearing etc
* Stiffness : Ability of wood to resist forces that tend to change its shape.
* Toughness : Ability of wood to absorb sudden and sharp shocks.
* Cleavability : The ease with which wood is split.
* Hardness : The ability to resist indentations and abrasion.

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REACTION WOOD : A type of wood produced in response to some physical stress. It is of two types:

ⓐ **Compression wood**: Produced on lower sides of branches of leaning and crooked stems of conifers

ⓑ **Tension wood**: Produced on the upper side of branches of dicots under leaning and crooking forces.

SEASONING : Removal of moisture from wood.

① **Air seasoning** : Exposure to air, no artificial heat.

② **Kiln seasoning**: Temperature, humidity and air circulation are maintained artificially.

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TIMBER:

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AEROPLANES:

FOR PROPELLERS: Michelia champaca / Chikrassia tabularis
(Magnoliaceae)

FOR CONSTRUCTION: Abies pindrow (Fir) : Pinaceae
Picea morinda (Spruce) : Pinaceae

FOR LINING: Cryptomeria japonica (Japanese Cedar) : Taxodiaceae
Erythrina suberosa (Coral Tree) : Papilionaceae

FOR TARGETS / OR MODELS: Bombax malabaricum (Semul) - Bombacaceae

AGRICULTURAL IMPLEMENTS: Acacia nilotica (Babul) - Mimosaceae
Delbergia sissoo (Sheesham) - Papilionaceae
Shored robusta (Sal) - Dipterocarpaceae

SHIP BUILDING: Tectona grandis (Sagwan) - Verbenaceae
Quercus sp (Oak) - (Fagaceae) -

LIFE SAVING EQUIPMENTS: Ochroma lagopus (Balsa wood) : Bombacaceae

CARTS & CARRIAGES: Dalbergia sp. ⇒ D. sissoo (Sheesham)
D. latifolia (Rosewood)

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SPORTS EQUIPMENTS: Racquets : Morus alba (Mulberry) : Moraceae

Billiard cues : Acer sp. (Maple) : Aceraceae
Diospyros melanoxylon (Tendu) or Ebony : Ebenaceae.

Cricket bats : Salix sp. (willow) : Salicaceae
Populus sp. (Poplar) :

Fishing rods : Dendrocalamus strictus } Poaceae
Arundinaria falcata }

Golf clubs : Hickoria sp.
Fraxinus sp. (Common Ash) : Oleaceae

Gun stocks : Juglans regia (Akhrot) Juglandaceae

Hockey sticks :
Stick : Morus alba (Shahtoot, Mulberry) – Moraceae.
Blade : Dalbergia sissoo

Stumps & bales : Grewia tiliafolia ('Phalsa') : Tiliaceae
Polyalthia fragrans (Ashok) : Annonaceae

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MUSICAL INSTRUMENTS :

Sitar, tanpoora, veena and violins : Adina cordifolia ('Haldu') : Rubiaceae
Dalbergia sissoo
Cucurbita fruit shells

Drums :

Albizzia lebbeck (Sirish) : Mimosaceae
Morus alba
Dalbergia sissoo

PENCILS : Juniperus macropoda (Virginian Pencil) : Cupressaceae

RAILWAY SLEEPERS : Shorea robusta
Tectona grandis
Mesua ferrea (Nagkesar) : Clusiaceae

MINEWORKS AND PITPROPS : Shorea robusta
Hopea parviflora

PRINTING BLOCKS : Betula alnoides (Betulaceae)
Mitragyna diversifolia (Kaim) : Rubiaceae
Toona ciliata (Toon) : Rutaceae

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OTHER IMPORTANT TIMBER YIELDING PLANTS:

Mahogany	Swietenia mahogoni	Meliaceae.
Cedar / Deodar	Cedrus deodara	Pinaceae.
Red cedar / Virginian pencil	Juniperus virginiana	"
Sandle wood	Santalum album	Santalaceae
Willow	Salix nigra	Salicaceae
Tulip tree	Liriodendron tulipifera	Magnoliaceae
Mango 'Aam'	Mangifera Indica	Anacardiaceae
Margosa 'Neem'	Azadirachta indica	Meliaceae.

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FIBRES AND FIBRE YIELDING PLANTS

Botanically fibre consists of very long, narrow cells, many times longer than they are broad. They are invariably quite thickwalled having a correspondingly small lumen so that the cell cavity often becomes nearly obliterated

They have simple, often oblique pits in their walls. At maturity, the fibre cell are now living structures and serve a purely mechanical function i.e. imparting strength and rigidity to the plant body.

The average length of the fibre cell is 1–3 mm but the ramie fibres are among the longest cells in higher plants being upto 55 cms long.

Fibre durability is conditioned by

1. the diameter of the fibre or fibrous aggregate;
2. thickness of the cell wall; and
3. purity of cellulose.

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CLASSIFICATION OF FIBRES:

I. ON THE BASIS OF NATURE AND STRUCTURE:

(a) BAST FIBRES: Also known as stem or soft fibres;
Associated with phloem, pericycle and cortex;
Derived mostly from dicotyledons;
Usually separated by retting (a process by which fibres are freed from other stem tissue through microbial activity).
Durable and able to resist bleaching;
Examples:
Flax, Jute, Hemp, Kenaf, Roselle and Ramie.

(b) STRUCTURAL FIBRES:
Also known as hard or leaf fibres;
Lignified cells ensheathing both xylem and phloem;
Primarily found in leaves of monocotyledons;
Coarser and weaker than soft fibres;
Separated by mechanical scraping;
Examples:
Manila Hemp, Sisal, New Zealand Hemp.

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(C) SURFACE FIBRES:

- Single celled outgrowths from the seeds or inner walls of fruits;
- Moderate in strength;
- Separated mechanically by a process called 'ginning';

Examples:

Cotton, Kapok.

II. ON THE BASIS OF THEIR USE:

(a) TEXTILE FIBRES:

- Used for the manufacture of fabric, netting and cordage;

Examples:

Hemp, Jute and cotton are more common while Flax is also used sometimes.

(b) BRUSH FIBRES:

- Twigs, leaves and bark are used for making brushes & brooms;

Examples:

Sisal, Piassava and broomcorn.

(C) PLAITING AND ROUGH WEAVING FIBRES:

- Roughly woven into hats, sandles, baskets, chair seats, matting,

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and thatched roofs of houses;

Examples:

Carludovica palmata leaves (for making PANAMA HATS) and Bamboo strips (for manufacturing fishing rods, furniture, baskets etc.)

(d) FILLING FIBRES:

- Used in upholstery, stuffing cushions, mattresses and in life preservers; for reinforcement and wallboard insulation.

Examples:

Kapok, Cotton, Jute, Spanish Moss, Grasses etc.

(e) NTURAL FIBRES:

- Tree basts are isolated which yield rough clothing after pounding

Example:

Broussonetia papyrifera bark (yields "tapa cloth").

(f) PAPER MAKING FIBRES:

- Wood fibres, textile fibres and various grasses and sedges are used.

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SOME POINTS TO REMEMBER:

FIBRE	CELLULOSE CONTENT(%)
COTTON	94 %.
SUNNHEMP	80%.
HEMP	67%.
FLAX	64%.
JUTE	63%.

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COMMON NAME OF THE PRODUCT	BOTANICAL NAME OF THE SOURCE PLANT	FAMILY	PLANT PART AND MORPHOLOGICAL COMMENT AND IMPORTANT FACTS	USES
COTTON				
Old World	Gossypium arboreum	Malvaceae	Epidermal hairs from the seed coat are the useful part.	Textile and filling.
	G. herbaceum	"		
New World	G. hirsutum	"		
	G. barbadense	"		
SUNN HEMP	Crotalaria juncea	Papilionaceae	Bast fibres from the stem. Fibres possess great tensile strength and resistance to microbes and moisture.	Essentially a cordage fibre. Used in making sail cloth, canvas and tissue paper.
HEMP	Cannabis sativa	Cannabinaceae	Bast fibre from the stem; Valuable because of their length, strength and durability; unaffected by water; resistant to normal bleaching lack elasticity.	Used where strength is more important than beauty as in carpet warp, canvas, sacking rope, cables etc.

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C.N	B.N.	F.	MORPHOLOGY	USES
CONGO JUTE	Urena lobata	Malvaceae	Obtained from the bark of the stem.	Ropes, carpets lessain etc.
COIR	Cocos nucifera	Arecaceae	The fibres are hard structural fibres obtained from the husks (mainly mesocarp) of the fruits.	As floor coveri-ng, in rope maki-ng, artificial horse hair, pape-pulp, thermal insulations, olive oil filters in filling seats etc.
PINEAPPLE	Ananas comosus	Bromeliaceae	Leaves are the source of a strong fibre which is shiny white, durable flexible and water-res-istant.	Made into fabrics ropes, fishing-nets and strings.

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C.N.	B.N.	F.	MORPHOLOGY	USES
MANILA HEMP OR ABACA	Musa textilis	Musaceae	A structural fibre obtained from the outer portions of the leaf stalks	Cordage, especially marine cables; 'dhoti' is also made from them
SISAL HEMP	Agave sisalana	Agavaceae	A structural fibre obtained from the leaves.	Ropes and twine.
MAURITIUS HEMP	Fureraea foetida	Amaryllidaceae	Structural fibres from the leaves.	Used for cordage mats sacks and soles of shoes.
NEWZEALAND HEMP	Phormium tenax	Agavaceae	Fibre from stem is obtained and variously used.	For twine, cordage mattings and towlines.
INDIAN BOWSTRING HEMP	Sanseviera roxburghiana	Liliaceae	Structural fibres are obtained from the succulent leaves.	For cordage and matting.

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C.N.	B.N.	F.	MORPHOLOGY	USES
ROSELLE	Hibiscus sabdariffa	Malvaceae	A bast fibre, silky, soft and lustrous; comparable to jute in strength and durability.	Generally the same uses as those of Jute.
RAMIE	Boehmeria nivea	Urticaceae	A bast fibre; long, strong and durable; longest onecelled fibres in plants.	Sacks, thread, cordage, paper and gas mante
COUNTRY MALLOW	Abutilon indicum	Malvaceae	A bast fibre of average properties.	Used for ropes, twine and cordage.
CHINA JUTE OR TIENTSIN JUTE	Abutilon theophrasti	-	"	"
KAPOK	Ceiba pentandra	Bombacaceae	A surface fibre obtained from the fruit; very elastic and not liable to bunch when used in upholstery.	Excellent stuffing material for pillows, cushions, mattresses etc; Also used in maki life-belts.

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C.N.	B.N.	F.	MORPHOLOGY	USES
RED SILK COTTON	Bombax ceiba	Bombacaceae	A surface fibre; the silky floss is obtained from the inner wall of the fruit.	It has the same uses as those of Kapok.
WHITE SILK COTTON	Cochlospermum religiosum	Cochlospermaceae	The fibre is obtained from the flowers.	Same as in kapok
MADAR AKUND	Calotropis gigantea C. procera	Asclepediaceae	Floss is obtained from the seed surface.	same as in Kapok
CAT'S TAIL	Typha angustifolia	Typhaceae	Hairs on the fruits are of commercial value.	same as in Kapok

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COMMON NAME OF THE PRODUCT	BOTANICAL NAME OF THE SOURCE PLANT	FAMILY	PLANT PART WITH MORPHOLOGICAL COMMENT AND IMPORTANT FACTS	USES
JUTE				
White Jute	Corchorus capsularis	Tiliaceae	A bast fibre of great commercial importance; Weaker than hemp and flax; perishable when exposed to dampn-ess.	Bagging, wrap-ing, cordage; manufacture of rugs, blankets carpets etc.
Tossa Jute	C. olitorius	"		
FLAX	Linum usitatissimum	Linaceae	A bast fibre known for their fineness, durability, flexibility, heat conductivity, moisture absorbance and great strength especia-lly when wet.	Woven into fabr used in household furnishing and as linen threads Flax Garments are quite cool in summers.
KENAF	Hibiscus cannabinus	Malvaceae	A bast fibre extracted from the inner cortex; It is comparable to jute in lustre, but is coarser and more brittle.	Rope and cordage fishing nets, sack and gunny bags, coarser canvas etc.

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CEREALS AND PSEUDOCEREALS

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The cereals have come to be the most important source of food for human beings. They belong to the family Poaceae and bears fruits called caryopsis. The general term under usage for caryopsis is 'grain'.

A broad classification recognises the following four major categories of the cereals:

(I) MAJOR CEREALS: They include wheat, rice and maize.

(II) MINOR CEREALS: They cover barley, oat and rye.

(III) SMALL GRAINS: Sorghum is an example of small grains.

(IV) MILLETS: Pearl millet, finger millet and fox-tail millet are the examples.

Moreover, a few plants yield seeds which are used as substitute to the cereal grains. Such plants are called 'pseudocereal' yielding plants. 'Kutu' or Buckwheat is an example of pseudocereal.

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COMMON NAME	BOTANICAL NAME	FAMILY	COMMENTS
MAJOR CEREALS			
PADDY / RICE. 'Dhan'/'Chawal'	Oryza sativa	Poaceae	Fruit / grain yields Kernel. The grain contains about 90% carbohydrates, 8-10% proteins, 1% fats and about 1% mineral matter.
3 varieties of Indian rice	SOWING / HARVESTING 'Aus': May/June — September/October 'Aman': June/July — November/December 'Boro': December/January — March/April		
WHEAT OR 'Gehun'	Triticum Sp.	"	Fruit / grain contains some 60-70% carbohydrates and 10-17% nitrogenous material.
3 varietal categories:			
EINKORN GROUP:	Triticum monococcum, T. boeoticum etc		
EMMER GROUP:	T. dicoccum T. durum etc.		
VULGARE GROUP:	T. aestivum sub.sp. vulgare, T. aestivum subsp. spelta etc		

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C.N.	B.N.	F.	COMMENTS
'INDIAN CORN' 'Makka'	Zea mays	Poaceae	The fruit is a caryopsis (like the previous cases of rice and wheat) and possess two kinds of endosperm, white and yellow, thus exhibiting the phenomenon of xenia. The grain contains carbohydrates proteins fats Calcium(Ca), magnesium(Mg) Vitamins A, B, C etc.
Major types:			
SWEET CORN:	Z. mays - saccharata		
POP CORN:	Z. mays - everta		
SOFT CORN:	Z. mays - amylacea		
MINOR CEREALS			
BARLEY 'Jau'	Hordeum vulgare	"	Caryopsis type of fruit bears 70% carbohydrates, 12% proteins and 2% mineral contents.

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C.N.	B.N.	F	COMMENTS
OAT or 'Jaii'	Avena sativa	Poaceae	Caryopsis contains about 82% non-nitrogenous matter including Carbohydrates, 14% nitrogenous matter and 4% mineral matter.
RYE	Secale cereale	〃	Also described as the grain of poverty.

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C.N.	B.N.	F.	COMMENTS	
SMALL GRAINS				
SORGHUM OR 'Jwar'	Sorghum vulgare	Poaceae	Fruit (Caryopsis)	
MILLETS				
PEARL MILLET ('Bajra')	Pennisetum typhoides	〃	Fruit caryopsis	
PROSOMILLET ('Kutki')	Panicum miliaceum	〃	Also called 'hogmillet' or Indian millet. Its Caryopsis grains are edible.	
FOXTAIL MILLET ('Kangni')	Setaria italica	〃	Caryopsis.	

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C.N.	B.N.	F.	COMMENTS
FINGER MILLET ("Ragi")	Eleusine coracana	Poaceae	Caryopsis.
KODO MILLET	Paspalum scrobiculatum	"	"
PSEUDOCEREALS			
'BUCKWHEAT' ('Kuttu')	Fagopryum esculentum	Polygonaceae	Seeds are hulled and their starch is made into flour which is eaten by many during ritual fasts like 'Navratri', as a substitute to grains of Cereals.

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PULSES

Pulses are obtained from the members of the dicotyledon angio-spermic family of plants, namely Leguminosae. The legumes or pods (fruit type) of the members split open along both the sutures to expose the dicotyledonous seeds. It is these seeds which constitute the pulses of commerce.

They are rich sources of proteins and sometimes the only source thereof for poor people.

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COMMON NAME	BOTANICAL NAME	FAMILY	PART USED	
PEA OR 'Matar'	Pisum sativum	Papilionaceae	Seeds	
GRAM OR 'Chana'	Cicer arietinum	"	"	
Black Gram OR 'Urd'	Vigna mungo	"	"	
GREEN GRAM OR 'Moong'	Vigna radiata	"	"	
COWPEA OR 'Lobia'	Vigna unguiculata	"	"	
BROAD BEANS OR 'Bakla'	Vicia faba	"	"	
PIGEON PEA OR 'Arhar'	Cajanus cajan	"	"	

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C.N.	B.N.	F.	PART USED	
LENTIL OR 'Masoor'	Lens culinaris	Papilionaceae	Seeds	
SOYBEAN	Glycine max	"	"	
PEANUT, GROUNDNUT OR 'Moongphali'	Arachis hypogea	"	Seeds are often eaten after roasting.	
CLUSTER BEAN OR 'Gwar'	Cyamopsis tetragonoloba	"	seeds.	
LIMA BEAN	Phaseolus lunatus	"	"	
'Moth'	Vigna acontifolia	"	"	
HORSE GRAM	Dolichos biflorus	"	"	

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OILS

'FATS' and 'OILS' denote crude lipid mixtures obtained from natural sources. Fats are solid at room temperatures and oils are liquid. They could be grouped as follows:

(I) **ESSENTIAL OILS:** They evaporate on coming on contact with air and hence emit pleasant fragrance. They are, therefore also known as volatile oils. Extraction occurs by distillation or pressure.
e.g. Lemon grass oil, Neroli oil, Lavender oil

(II) **FATTY OILS:** They don't get evaporated and are actually the reserve food of seeds. Their nickname is 'fixed oils' and they are extracted through application of pressure.
They have further four categories:

① **Drying oils:** They dry up, forming an elastic film.
eg: Tung oil, Safflower oil and Soybean oil e

② **Semi-drying oils:** They include mustard oil, rapese oil, Sunflower oil, cottonseed oil etc

③ **Nondrying oils:** Peanut oil, Olive oil etc are the examples.

④ **Vegetable fats:** They include coconut oil and palm oil etc

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IMPORTANT POINTS :

* It could be important to note that common fatty acids are either saturated (eg. palmitic acid, stearic acid) or unsaturated (eg. oleic acid, linoleic acid and linolenic acid).

* Drying oils mainly contain linoleic and linolenic acids while drying oils contain oleic acids predominantly.

* Coconut oil contains rich amounts of lauric and myristic acids.

* Palm oil is rich in oleic and palmitic acids and appears orange in colour due to β-carotene. It is a substitute for cod liver oil.

* Tung oil is especially rich in elaeostearic acid.

* Soybean oil is highly unsaturated and contains sitosterol and stigma-sterol.

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OILS

COMMON NAME	BOTANICAL NAME	FAMILY	PART(S) USED	USES
CORN OIL	Zea mays	Poaceae	seeds.	Edible; in soaps and paints.
PEANUT OIL	Arachis hypogea	Papilionaceae	"	Edible and in soap industry
OLIVE OIL	Olea europaea	Oleaceae	Fruits	Edibles and in soap & paint industry.
CASTOR OIL	Ricinus communis	Euphorbiaceae	seed	As protective coati lubricant, illumi -ant etc.
COCONUT OIL	Cocos nucifera	Arecaceae	"	Edible, in soaps, confectionary and cosmetics.

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C.N.	B.N.	F.	PART(S) USED	USES
MUSTARD OIL	Brassica campestris	Brassicaceae	Seeds	Edible and as an illuminant & lubricant and in soap and rubber industry.
RAPESEED OIL	B. napus	〃	〃	As illuminant and lubricant and in cooking
COTTON SEED OIL	Gossypium sp.	Malvaceae	〃	Edible; used also in soap.
SUNFLOWER OIL	Helianthus annuus	Asteraceae	〃	Edible and in paint and soap industry.
SESAME OIL	Sesamum indicum	Pedaliaceae	〃	Edible; hair oil, soaps etc

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C.N.	B.N.	F.	PART(S) USED	USES
Otto of Roses	Rosa damascena R. centifolia	Rosaceae	Flowers.	Perfumery.
Rosmary oil	Rosmarinus officinalis	Lamiaceae	Leaves and flowering twigs.	
Sandalwood oil	Santalum album	Santalaceae	Wood.	Perfumery and medicinal industry
'Khas'	Vetiveria zizanioides	Poaceae	Roots.	Perfumery and cosmetics.
'Kapur' OR CAMPHOR	Cinnamomum camphora	Lauraceae	wood.	Medicines.
Eucalyptus oil	Eucalyptus globulus E. citriodora	Myrtaceae	Leaves.	In perfumery and as insect repellant and germicide.

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C.N.	B.N.	F.	PARTS USED	USES
Ylang ylang oil	Cananga odorata	Annonaceae	Flowers yield oil.	In perfumery and soap manufacture.
'Neroli Oil'	Citrus aurantium var aurantium	Rutaceae	Flowers	In perfumery.
'Petitgrain oil'	"	"	Leaves & young shoots	"
Lemongrass oil	Cymbopogon citratus	Poaceae	Leaves	"
Citronella oil	C. nardus	"	"	"
Palmarosa oil	C. martinii var. motia	"	"	"
Ginger grass oil	C. martinii var. sofia	"	"	"
Jasmine oil	Jasminum sp.	Oleaceae	Flowers	
Lavender oil	Lavendula officinalis	Lamiaceae	"	Perfumery and cosmetics.

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C.N.	B.N.	F.	PART(S) USED	USES
Clove oil	Syzygium aromaticum	Myrtaceae	Flower buds	As stimulant, carminative and toothache reliever and also in toilet preparation.
Linaloe	Bursera penicillata	Burseraceae	wood	In perfumery.
Cyperus oil	Cyperus scariosus	Cyperaceae	Tubers.	In perfumery and as fixative
Carnation oil	Dianthus caryophyllus	Caryophyllaceae	Flowers.	In perfumery
Hyacinth oil	Hyacinthus orientalis	Liliaceae	Flowers.	"
Cedar wood oil	Juniperus virginiana	Cupressaceae	Wood.	In perfumery, soaps, medicine polishing and a insecticide.
Champaca oil	Michelia champaca	Magnoliaceae	Flowers	In perfumery

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C.N.	B.N.	F.	PART(S) USED	USES
TUNG OIL	Aleurites fordii	Euphorbiaceae	Seeds.	In varnishes as substitute of linseed oil.
SAFFLOWER OIL	Carthamus tinctorius	Asteraceae	Seeds.	In varnishes, cosmetics and also as illuminant
SOYBEAN OIL	Glycine max	Papilionaceae	Seeds	As cooking medium and salad oil.
LINSEED OIL	Linum usitattissimum	Linaceae	"	In paint and varnishes.
NIGER SEED OIL	Guizotia abyssinica	Asteraceae	"	In soap and as illuminant.
POPPY OIL	Papaver somniferum	Papaveraceae	"	In paints as illuminant.

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C.N.	B.N.	F.	PART(S) USED	USES
'Nutmeg Oil'	Myristica fragrans	Myristicaceae	Seed	In cosmetics and confectionary.
MENTHOL	Mentha arvensis var piperasens	Lamiaceae	Leaves	In medicines, cosmetics and
GERANIUM OIL	Pelargonium graveolens	Geraniaceae	"	In perfumery
PATCHOULI OIL	Pogostemon cablin P. benghalense	Lamiaceae	"	In medicine and perfumery.

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C.N.	B.N.	F.	PART(S) USED	USES
PALM OIL	Elaeis guineensis	Arecaceae	Fruit.	In cooking; as lubricant and in soaps.
MAHUA OIL	Madhuca indica	Sapotaceae	Seed	In cooking and in candles

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VEGETABLES.

Vegetables are those plants which store up reserve food in roots, stems leaves and fruits which are eaten cooked or raw as salad plants.

Vegetables are conveniently categorised into three classes –

(I) EARTH VEGETABLES : They store food in their underground parts in roots or stems.
eg: Potato, 'Mooli', 'Gajar', Chukander etc.

(II) FRUIT VEGETABLES: Their fruits are eaten as vegetables.
eg. 'Bhindi', 'Kathal', 'Kaddu', 'Baingan' and 'Tamatar'

(III) LEAF VEGETABLES: Their leaves are cooked or eaten raw as salad.
eg: Pyaj, Lahsun, Band Gobhi, 'Salaad patta', 'Paalak', 'Bathua' etc.

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COMMON NAME	BOTANICAL NAME	FAMILY	PART(S) USED	
BEET OR 'Chukander'	Beta vulgaris	Chenopodiaceae	Stem.	
POTATO OR 'Alu'	Solanum tuberosum	Solanaceae	Stem (Tubers)	
'Arvi'	Colocasia esculenta	Araceae	Tubers	
TARO OR 'Kachalu'	Colocasia antiquorum	"	Corms	
Kaseru	Cyperus esculentus	Cyperaceae	Tubers	
YAM OR 'Pindalu'	Dioscorea alata	Dioscoreaceae	Corm and bulbil	
JERUSALEM ARTICHOKE	Helianthus tuberosus	Asteraceae	Tubers	
Kamal Kakri'	Nelumbo nucifera	Nelumbonaceae	Rhizomes.	
'Kamal Kakri'	Nymphaea nauchali	Nymphaeaceae	"	

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C.N.	B.N.	F.	PART(S) USED
TURNIP OR 'Shaljam'	Brassica rapa	Brassicaceae	Roots and Leaves
RADISH OR 'Mooli'	Raphanus sativus	"	"
CARROT OR 'GAJAR'	Daucus carota	Apiaceae	Roots.
SWEET POTATO OR 'Shakarkand'	Ipomoea batata	Convolvulaceae	Adventitious roots.
ELEPHANT FOOT OR 'Zimikand'	Amorphophallus campanulatum	Araceae	Corm
'Sunthni'	Dioscorea esculenta	Dioscoreaceae	Roots
CASSAVA	Manihot esculenta	Euphorbiaceae	"

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C.N.	B.N.	F.	PART(S) USED
PUMPKIN OR 'Sitaphal'	Cucurbita moschata	Cucurbitaceae	Fruits (Pepo)
RED PUMPKIN	C. maxima	"	"
FIELD PUMPKIN	C. pepo	"	"
BOTTLE GOURD OR 'Lauki'	Lagenaria siceraria	"	"
SPONGE GOURD OR 'Ghiyatarai'	Luffa cylindria	"	"
BITTER GOURD OR 'Karela'	Momordica charantia	"	"
CHAYOTE	Sechium edule	"	"
SNAKE GOURD OR 'Chichinda'	Trichosanthes anguina	"	"
POINTED GOURD 'Parwal'	T. dioica	"	"

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C.N.	B.N.	F.	PART(S) USED	
LADY'S FINGER OR 'Okra'/'Bhindi'	Abelmoschus esculentus	Malvaceae	Fruits. (Capsules)	
JACK FRUIT OR 'Kathal'	Artocarpus integrifolia	Moraceae	Fruits (sorosis)	
TOMATO 'Tamatar'	Lycopersicon esculentum	Solanaceae	Fruit (Berries)	
BRINJAL OR 'Baigan'	Solanum melongena	"	"	
ASH GOURD OR 'Petha'	Benincasia hispida	Cucurbitaceae	Fruits (pepo)	
'Tinda'	Citrullus lanatus var. fistulosus	"	"	
'Kundru'	Coccinia cordifolia	"	"	
CUCUMBER OR 'Kheera'	Cucumis sativa	"	"	

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C.N.	B.N.	F.	PART(S) USED	
LEETUCE OR 'Salad'	Lactuca sativa	Asteraceae	Basal rosette of leaves.	
SPINACH OR 'Palak'	Spinacea oleracea	Chenopodiaceae	"	
'CELERY' OR 'Ajmod'	Apium graveolens	Apiaceae	Leaves.	
'Chaulai'	Amaranthus sp.	Amaranthaceae	Leaves	
'Satavar'	Asparagus officinalis	Liliaceae	Young twigs.	
Fenugreek OR 'Maithi'	Trigonella foenum-graecum	Papilionaceae	Leaves & twigs.	
PURSLANE OR 'Kulfa'	Portulaca oleracea	Portulacaceae	Leaves.	
'Nari-ka-saag'	Ipomoea aquatica	Convolvulaceae	leaves.	

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C.N.	B.N.	F.	PART(s) USED
ONION 'Pyaj'	Allium cepa	Liliaceae	Bulbs and leaves. It contains allyl sulphide
GARLIC OR 'Lahsun'	Allium sativum	"	Bulbs and leaves. It contains diallyl disulphide.
CAULIFLOWER OR 'Phool Gobhi'	Brassica oleracea var. botrytis	Brassicaceae	Inflorescence.
CABBAGE OR 'BAND GOBHI'	B. oleracea var. capitata		Leaves.
Knolkhol 'Ganth Gobhi'	B. oleracea var. gongylodes		Stem.
BRUSSELS SPROUT OR 'Button Gobhi'	B. oleracea var. gemmifera		Axillary buds.
CHINESE CABBAGE	B. oleracea var pekinensis		Leaves.

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FRUITS

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Technically, 'fruit' means a structure developed from a single ovary of a single flower. Commercially, however, the term fruit includes even such structures which are edible and contributed by ovary as well as some accessory parts of the flower or inflorescence. The former case is termed as 'aggregate fruit' and the latter as composite fruit.

For commercial usage, fruits are categorised as follows:

(I) TROPICAL FRUITS: They include 'Cheeku', 'Ananas', 'Shareefa', 'Papeeta', 'Neebu', 'Santara', Litchi, 'Aam', 'Amrood', 'Anaar', 'Bel', 'Anjeer', 'Kela', 'Phalsa', etc.

(II) TEMPERATE FRUITS: They include Kharbuja, 'Tarbooze', Shahtoot, Seb, 'Nashpati', 'Khubani', 'Aaru', Angoor' etc.

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COMMON NAME	BOTANICAL NAME	FAMILY	FRUIT TYPE	EDIBLE PART
FIG (Anjeer)	Ficus carica	Moraceae	Syconus.	Receptacle.
MANGOSTEEN	Garcinia mangostana	Garciniaceae	Berry	Pericarp
PHALSA	Grewia subinaequalis	Tiliaceae	"	"
Khirni'	Manilkara hexandra	Sapotaceae	"	"
JAMBOLAN (Jamun)	Syzygium cuminii	Myrtaceae	"	"
Rose Apple (Gulab Jamun)	S. jambos	"	"	"
DATE (Pind Khajur)	Phoenix dactylifera	Arecaceae	"	"
DATE (Khajur)	P. sylvestris	"	"	"
OLIVE (Jaitoon)	Olea europea	Oleaceae	Drupe	Mesocarp.
Jujube (Ber)	Zizyphus jujuba	Rhamnaceae	"	Epicarp and Mesocarp.

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C.N.	B.N.	F.	FRUIT TYPE	EDIBLE PART(S)
GUAVA (Amrud)	Psidium guajava	Myrtaceae	Berry.	Pericarp and placenta.
POMEGRANATE (Anaar)	Punica granatum	Punicaceae	Balausta.	Testa of seed.
WOOD APPLE (Bel)	Aegle marmelos	Rutaceae	Amphisarca.	Placenta and inner pericarp.
CARAMBOLA (Kamrakh)	Averrhoa carambola	Oxalidaceae	Berry	Pericarp.
'Karaunda'	Carissa carandus	Apocynaceae	Berry	Pericarp
PERSIMMON	Diospyros kaki	Ebenaceae	"	"
'Aonla'	Emblica officinalis	Euphorbiaceae	"	"
LOCQUAT	Eriobotrya japonica	Rosaceae	"	Mesocarp.
ELEPHANT APPLE (Kainth)	Feronia limonia	Rutaceae	Amphisarca	Placenta and inner pericarp.

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C.N.	B.N	F.	FRUIT TYPE	EDIBLE PART(
LIME (Kagzi Nibu)	Citrus aurantifolia	Rutaceae	Hesperidium	Juicy endoca- hairs.
BITTER ORANGE ('Khatta')	C. aurantium	"	"	"
LEMON (Nibu)	C. limon	"	"	"
SWEET LIME (Meetha Neebu)	C. limettioides	"	"	"
SHADDOCK (Chakotra)	C. maxima	"	"	"
CITRON (Bara Neebu)	C. medica	"	"	"
GRAPE FRUIT (Pahari Neebu)	C. paradisi	"	"	"
LOOSE SKIN/MANDARIN ORANGE (Santara)	C. reticulata	"	"	"
SWEET ORANGE (Mosambi)	C. sinensis	"	"	"

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C.N.	B.N.	F.	FRUIT TYPE	EDIBLE PART(S)
MUSK MELON (Kharbooja)	Cucumis melo	Cucurbitaceae	Pepo.	Mesocarp and endocarp.
WATER MELON (Tarbooz)	Citrullus lanatus	"	"	"
CUCUMBER	Cucumis sativus	"	"	"
CUCUMBER (Kakri)	Cucumis utilissimus	"	"	"
MULBERRY	Morus alba (white) Morus nigra (Black)	Moraceae	Sorosis "	Fleshy perianth
Grape (Angoor)	Vitis vinifera	Vitaceae	Berries	Pericarp and placentae.
ALPINE STRAWBERRY	Fragaria vesca	Rosaceae	Etaerio of achenes.	Fleshy thalamus
~~RASPBERRY~~ (~~Rasbha~~ Hisalu)	Rubus sp.	Rosaceae	Etaerio of drupes.	Pericarp.
'CHIRONJI'	Buchanania lanzan	Anacardiaceae	Drupe	Seed.

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C.N.	B.N.	F.	FRUIT TYPE	EDIBLE PART(S)
SAPODILLA ('Cheeku')	Achras sapota	Sapotaceae		Epicarp.
"PINE APPLE" ('Anannas')	Ananas sativa	Bromeliaceae	Sorosis	Outer axis, bract, perianth and pericarp.
CUSTARD APPLE ('Sharifa')	Anona squamosa	Anonaceae	Etaerio of berries.	Pericarp.
PAPAYA ('Papeeta')	Carica papaya	Caricaceae	Berries	Mesocarp.
LITCHI	Litchi sinensis	Sapindaceae	Nuts	Aril
MANGO ('Aam')	Mangifera indica	Anacardiaceae	Drupe	Mesocarp.
BANANA ('Kela')	Musa paradisiaca	Musaceae	Berry	Mesocarp and endocarp.

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C.N.	B.N.	F.	FRUIT TYPE	EDIBLE PART(S)
ALMOND (Badam)	Prunus amygdalus	Rosaceae	Drupe	Seed.
APRICOT ('Khubani')	Prunus armeniaca	Rosaceae	Drupe	Epicarp and mesocarp.
SWEET CHERRY ('Gilas')	P. avium	"	"	"
PLUM (Alucha)	P domestica subsp. institia	"	"	"
PEACH (Aaru)	P. persica	"	"	"
PEAR (Nashpati)	Pyrus communis	"	Pome	Fleshy thalamus
APPLE (Seb)	P. malus	"	"	"
CHINESE PEAR	P. pyrifolia var. culta	"	"	"

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C.N.	B.N.	F.	FRUIT TYPE	EDIBLE PART(S)
PISTACHIO NUT OR 'Pista'	Pistacia vera	Anacardiaceae	Drupe	Seeds (Cotyledons)
ENGLISH WALNUT OR 'Akhrot'	Juglans regia	Juglandaceae	"	"
COCONUT OR 'Nariyal'	Cocos nucifera	Arecaceae	"	Seeds or kernel called 'COPRA' & liquid endosperm
BRAZIL NUT	Bertholletia orata	Lecythidaceae.	NUTS	Seeds.
AMERICAN CHESTNUT	Castanea dentata	Fagaceae.	NUTS	"
JAPANESE CHESTNUT	C. crenata & C. sativa			
HICKORY NUT	Carya orata	Juglandaceae	NUTS	"
HAZEL NUT	Corylus americana	Betulaceae	NUTS	"
PINE NUT OR 'Chilgoza'	Pinus gerardiana	Pinaceae.	NO FRUIT IS PRODUCED	SEEDS.

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SPICES AND CONDIMENTS

Due to little nutritive value they are technically excluded from food articles. However, owing to their aroma, flavouring ability and preservative value, they are deemed significant. Several spices have carminative and antiseptic property also.

For all practical purposes, the term Spice is restricted to hard and hardened parts of the plants usually used after pulverisation, and the term 'condiment' includes spices and any other flavouring materials that have sharp taste and usually added to food after it has been cooked.

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COMMON NAME	BOTANICAL NAME	FAMILY	PART(S) USED	USES
ANGELICA OR 'Chora'	Angelica archangelica	Apiaceae	Roots and fruits	In flavouring cakes and liquors.
TURMERIC OR 'Haldi'	Curcuma longa	Zingiberaceae	Rhizomes contain 'curcumin'	Ingredient in numerous Indian curries.
ASAFOETIDA OR 'Heeng'	Ferula asafoetida	Apiaceae	Roots yield a gum-resin.	Flavouring food
GINGER OR 'Adrak'	Zingiber officinale	Zingiberaceae	Rhizomes are used fresh or dried ('SAUNTH'). Its essential oil contains a sesquiterpene zingiberene.	Flavouring food drinks and liquors.
GALANGEL OR 'Kulinjan'	Alpinia galanga	Zingiberaceae	Rhizomes.	Flavouring food

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C.N.	B.N.	F.	PART(S) USED	USES
'RED' CHILLIES or 'Lal mirch'	Capsicum frutescens.	Solanaceae	Fruits contain the pungent principle called 'capsicin'.	As a condiment in curries, sauces and pickles.
'Shimla Mirch'	C. annuum	〃	〃	As vegetable also.
'Siah Zeera' or CARAWAY	Carum carvi	Apiaceae	Fruits.	In Confectionary, bakery and in flavouring beverages.
'Zeera' or CUMIN	Cuminum cyminum	〃	〃	In cussies, cheese, pickles, soups etc
FENNAL or 'saunf'	Foeniculum vulgare	〃	〃	Flavouring food liquors and masticatories.
Black pepper 'Kali Mirch'	Piper nigrum	Piperaceae	Fruits contain an alkaloid 'piperine'	Flavouring curri and pickles.
LONG PEPPER 'PEEPAL'	P. longum	〃	〃	

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C.N.	B.N.	F.	PART(S) USED	USES
AMMI OR 'Ajwain'	Trachyspermum ammi	Apiaceae	Fruits	Flavouring curries
'Kala Zeera'	Bunium persicum	Apiaceae	"	"
GREATER CARDAMOM 'Bari elaichi'	Amomum subulatum	Zingiberaceae	Seeds	"
INDIAN MUSTARD OR 'Rai'	Brassica juncea	Brassicaceae	"	Flavouring food
WHITE MUSTARD OR 'Safed Rai'	B. hirta	"	"	"
BLACK MUSTARD OR 'Kali Rai'	B. nigra	"	"	"
CARDAMOM OR 'Chhoti elaichi'	Elettaria cardamomum	Zingiberaceae	"	In curries, pickles and with betel lea
NUTMEG OR 'Jaiphal'	Myristica fragrans	Myristicaceae	DRIED SEED WITHOUT TESTA	In flavouring curr pudding & custard
MACE OR 'Javitri'	"	"	ARIL ATTACHED TO SEED TIP	"

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C.N.	B.N.	F.	PART(S) USED	USES
SARSAPARILLA	Smilax aristolochiaefolia S. officinalis	Liliaceae	Roots	Flavouring food
CINNAMON OR 'Dal chini'	Cinnamomum zeylanicum	Lauraceae	Bark	"
'CASSIA'	C. cassie	"	"	"
INDIAN CASSIE OR 'Tejpat'	C. tamala	"	Leaves and bark.	"
CORIANDER OR 'Dhaniya'	Coriandrum sativum	Apiaceae	Leaves and fruits	"
MAJORAM OR 'Marua'	Majorana hortensis	Lamiaceae	Leaves, flowers and young shoots	"
MINT OR 'Pudina'	Mentha sp.	"	Leaves	"

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C.N.	B.N.	F.	PART(S) USED	USES
'Curry patta' OR 'Meetha Neem'	Murraya koenigi	Rutaceae	Leaves are used especially in South India.	Flavouring foo
THYME	Thymus vulgaris	Lamiaceae	Leaves.	"
DILL OR 'Soya'	Anethum graveolens A. sowa	Apiaceae	Leaves.	
SAFFRON OR 'Kesar'	Crocus sativus	Iridaceae	Dried styles and stigmas.	Provide yellow colour and characteristic pleasant odour
CLOVE OR 'Laung'	Syzygium aromaticum	Myrtaceae	Flower buds.	Flavour and aroma to food.
ROSE OR 'Gulab'	Rosa sp.	Rosaceae	Flowers	"

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C.N.	B.N.	F.	PART(S) USED	USES
FENUGREEK OR 'Maithee'	Trigonella foenumgraecum	Papilionaceae	seeds	In flavouring curries & pickles
GARLIC OR 'Lahsun'	Allium sativum	Liliaceae	Bulb.	In curries and in and as pickles
VANILLA	Vanilla plantifolia	Orchidaceae	Fruits	Flavouring food.
TAMARIND	Tamarindus indica	Caesalpiniaceae	Fruits	Flavouring curries and pickle.
PARSLEY	Petroselinum crispum	Lamiaceae	Leaves	Flavouring food
ANISE	Pimpinella anisum	Apiaceae	Fruits	"
"HORSE RADISH"	Armoracea lapathifolia	Brassicaceae	Roots	"

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FODDER PLANTS.

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FODDER

ELEPHANT GRASS OR NADIER GRASS	Pennisetum purpureum	Paceae	whole vegetative shoot.
Sudan Grass	Sorghum sudanense	"	"
GUINEA GRASS	Panicum maximum	"	"
PARA GRASS	Brachiaria mutica	"	"
'Berseem'	Trifolium alexandrium	Leguminosae	"
INDIAN CLOVER or 'Senji'	Melilotus indica	"	"
LUCERNE	Medicago sativa	"	"
"Doob"	Cynodon dactylon	Poaceae	"
'Jowar'	Sorghum vulgare	"	"
OATS	Avena sativa	"	"
Teosinte	Euchlaena mexicana	"	"

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MAIZE	Zea mays	Poaceae	Stem and leaves.	
PADDY STRAW	Oryza sativa	"	"	
WHEAT STRAW	Triticum aestivum	"	"	
BANYAN TREE	Ficus benghalensis	Moraceae	Leaves to goats	
FICUS	F. infectoria	"	"	

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BEVERAGES

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Beverages include liquids which are usually drunk / taken for their palatable and refreshing nature. Generally liquids other than constitute beverages.

They are classified as follows :

① NON-ALCOHOLIC BEVERAGES : These include tea, coffee, cola, cocoa etc.

② ALCOHOLIC BEVERAGES : These include either fermentation products like Beer, Wine etc or distilled products like whisky, Gin, Brandy and Rum etc.

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COMMON NAME	BOTANICAL NAME	FAMILY	PART(S) USED
TEA OR 'Chai'	Thea sinensis OR Camellia sinensis	Theaceae	Young leaves are picked by hand and then fermented to black colour. They are then dried and graded carefully. Tannin and alkaloid (theine) are present in leaves.
COFFEE	Coffea Sp. C. arabica = Arabian Coffee C. liberica = Liberian coffee C. robusta = Congo coffee	Rubiaceae	Roasted seed power of the plant, which contain 'Caffeine'.
COCOA	Theobroma cacao	Sterculiaceae	Seeds.
COLA	Cola acuminata Cola nitida	"	"
MATE	Ilex paraguarienois	Ilexaceae	Leaves

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C.N.	B.N.	F.	PART(S) USED
HOPS	Humulus lupulus	Cannabinaceae	Dried female flower.
BEER	Hordeum vulgare	Poaceae	Fermentation product of starch obtained from grains. It contains 3 – 6 % alcohol.
WINE	Vitis vinifera	Vitaceae	Fermentation product of fruit juice. It contains 12 – 20 % alcohol.
GIN	Hordeum vulgare	Poaceae	Distillation product from the fermented mash of malt. It contains abant 40 % alcohol.
RUM	Saccharum officinarum	Poaceae	Distillation product from molasses. It contains abant 40 % alcohol.

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C.N.	B.N.	F.	PART(S) USED
WHISKY	Cereals OR	Poaceae	
	Solanum tuberosum	Solanaceae	Distillation product of malted or unmalted cereal or potato starch. It contains about 50% alcohol.
BRANDY	Vitis vinifera	Vitaceae	Distillation product of wine. It contains 65 – 70% alcohol.
FENNY	Anacardium occidentale	Anacardiaceae	Distillation product from cashew nut.

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DRUG YIELDING PLANTS

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COMMON NAME	BOTANICAL NAME	FAMILY	PART(S) USED	USES
ACONITE OR Meethazahar	Aconitum napellus	Ranunculaceae	The tuberous roots contain alkaloids like 'aconite'.	Rheumatism and neuralgia
SWEET FLAG OR 'Bach'	Acorus calamus	Araceae	Rhizomes are used.	Emetic, expectorant and treats Chronic diarrhoea and dyspepsia
IPEACAC	Cephaelis ipecacuanha	Rubiaceae	Roots are used.	In amoebic dysentery and as expectorant.
COLCHICUM OR 'HIRANTUTIYA'	Colchicum luteum	Liliaceae	Roots and corms of the plant are used which contain an alkaloid "colchicine".	In gouts, rheumatism and diseases of liver
TURMERIC OR 'Haldi'	Curcuma longa	Zingiberaceae	Rhizomes are used.	Used to cure ulcers diarrhoea and skin disease

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C.N.	B.N.	F.	PART(S) USED	USES
YAM	Dioscorea sp	Dioscoreaceae	Rhizome contains a steroid 'diosgenin'	As eye ointments and in preparation of contraceptive pills.
ASA-FOETIDA OR Heeng	Ferula asafoetida	Apiaceae	Gum resin is obtained from the roots.	In Cough, indigestion and asthma.
LICORICE OR 'Mulehthi'	Glycerrhiza glabra	Papilionaceae	Dried roots of the plant.	As demulcent and expectorant
Chandra Mool	Kaempferia galenga	Zingiberaceae	Rhizomes are used.	Stimulant and carminative.
GINSENG	Panax schinseng	Asaliaceae	Roots of the plant.	A variety of diseases are cured especially in China.

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C.N.	B.N.	F.	PART(S) USED	USES
'SARPGANDHA'	Rauvolfia serpentina	Apocynaceae	Tuberous roots contain the alkaloid 'reserpine'.	In lowering of blood pressure, mental disorder, diarrhoea and dysentery.
'RHUBARB'	Rheum officinale	Polygonaceae	Rhizomes and roots yield 'Rhubarb'.	In intestinal disorders, especially as laxative and tonic.
'ASGANDH'	Withania somnifera	Solanaceae	Roots contain an alkaloid 'withaferin-A' having antibiotic properties.	In rheumatism, cough, ulcers.
GINGER OR 'ADRAK'	Zingiber officinale	Zingiberaceae	Rhizomes.	In rheumatism, piles, neuralgia, toothache and diseases of eye.

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C.N.	B.N.	F	PART(S) USED	USES
EPHEDRA	Ephedra sinica E. equisetina	Gnetaceae	Green stems contain the alkaloid 'ephedrine'.	In cold & asthma.
SANDAL OR 'CHANDAN'	Santalum album	Santalaceae	Stem	In skin diseases.
GALBANUM 'Bairoga' OR	Ferula galbaniflua	Apiaceae	Stem	In bronchitis and asthma
GUIACUN	Guiacun officinale	Zygophyllaceae	Hard resin from wood	As stimulant and laxative.
QUASSIA	Picrasma excelsa	Simarubaceae	Stem	In dyspepsia and malaria.
INDIAN KINO OR 'Pitsara'	Pterocarpus marsupium	Papilionaceae	Stem	In diarrhoea and toothache.

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C.N.	B.N.	F	PART USED	USES
QUININE	Cinchona officinalis	Rubiaceae	Bark.	In treatment of malaria.
'CINNAMON' OR 'Dalchini'	Cinnamomum zeylanicum	Lauraceae	"	In diarrhoea and gastric troubles and controlling blood sugar.
INDIAN REDWOOD OR ROHAN	Soymida febrifuga	Meliaceae	"	In diarrhoea dysentory and malaria.
INDIAN MEDLAR OR 'Maulsiri'	Mimusops elagni	Sapotaceae	"	Diseases of gums and teeth.
'ASHOK'	Saraca indica	Caesalpiniaceae	"	In leucorrhoea.
'KUCHLA'	Strychnos toxifera	Loganiaceae	"	In relaxing muscles.

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C.N.	B.N.	F.	PART(S) USED	USES
'ANASPHAL'	Illicium verrum	Magnoliaceae	Fruits	As carminative and expectorant.
'SAFED ARAND'	Jatropha curcas	Euphorbiaceae	Seed oil	As purgative.
'SAHJAN'	Moringa oleifera	Moringaceae	Seed oil.	In rheumatism and gouts.
'KARANJA'	Pongamia pinnata		Seed oil.	In skin diseases.
CASTOR or 'ARAND'	Ricinus communis	Euphorbiaceae	Seed oil contains an alkaloid 'ricinine'.	As laxative and purgative.
BLACK NIGHTSHADE OR 'Makoi'	Solanum nigrum	Solanaceae	Fruits	As laxative, expectorant and also used as cardiac tonic.

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C.N.	B.N.	F.	PART(S) USED	USES
BALLERIC MYROBALAN OR 'Bahera'	Terminalia ballerica	Combretaceae	Ripe fruits.	As tonic & laxative and in piles & diarrhoea.
			Semi-ripe fruits.	As purgative.
CHEBULIC MYROBALAN OR 'Harark'	Terminalia chebula	"	Ripe fruits.	As tonic and laxative and in diarrhoea, dysentery, flatulence and asthma.
AMMI OR 'Ajwain'	Trachyspermum ammi	Apiaceae	Fruits.	As carminative and stimulant and in diarrhoea and dysentery.
'AMALTAS'	Cassia fistula	Caesalpiniaceae	"	As purgative and in diabetes.
COLOSYNTH OR 'Indrayan'	Citrullus colosynthus	Cucurbitaceae	Fruits contain glucosides.	Powerful purgative

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C.N.	B.N.	F.	PART(S) USED	USES
EMBLIC MYROBALAN	Emblica officinalis	Euphorbiaceae	Fruits.	As laxative, diuretic and tonic. Also, they relieve constipation & vomitting.
FENNEL OR 'Saunf'	Foeniculum vulgare	Apiaceae	"	As carminative, stimulant and appetiser. They also relieve flatulence, thirst and problems of kidney & spleen.
'CHAULMOOGRA'	Hydnocarpus kurzii	Flacourtiaceae	Seed oil.	In skin diseases including leprosy.
OPIUM POPPY 'Afeem'	Papaver somniferum	Papaveraceae	Latex from unripe fruits contains many alkaloids.	Alkaloid morphine relieves pain and codeine is analgesic.

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C.N.	B.N.	F.	PART(S) USED	USES
'KABABCHINI' OR CUBEBS	Piper cubeba	Piperaceae	Fruits.	In catarrh and as kidney stimulant.
'PIPLAMOOL' OR LONG PEPPER	Piper longum	"	"	carminative; In treatment of bronchitis and asthma.
BLACK PEPPER 'Kali Mirch'	Piper nigrum	"	"	As carminative and stimulant. Also used in choler diarrhoea and flatulence.
NUX VOMICA OR 'Kuchla'	Strychnos nux vomica	Loganiaceae	Seeds contain alkaloids like strychnine and brucine.	In nervous disorders and paralysis.

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C.N.	B.N.	F.	PART(s) USED	USES
HOPS	Humulus lupulus	Moraceae	Flowers contain a narcotic principle 'lupulin'.	As sedative and as tonic.
WOOD APPLE OR 'Bel'	Aegle marmelos	Rutaceae	Fruit pulp is cooling	As laxative & astringent in diarrhoea and dysentery.
'JAMALGHOTA'	Croton tiglium	Euphorbiaceae	seed oil.	Powerful purgative.
CUMIN OR 'Zeera'	Cuminum cyminum	Apiaceae	Fruits	As carminative stimulant and astringent. Also used in diarrhoea and nausea.

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C.N.	B.N.	F.	PART(s) USED	USES
SANTONIN	Artemisia cina	Asteraceae	Flower buds.	As purgative as well as anthelmintic.
IRON WOOD OR 'Nagkesar'	Mesua ferrea	Clusiaceae	"	In dysentery and bleeding piles.
'VIOLET' OR 'Banafsha'	Viola odorata	Violaceae	Flower buds and flowers.	As diuretic, laxative and astringent.
'CHARAS'	Cannabis sativa	Cannabinaceae	Flowers contain a hallucinogenic principle called 'Tetrahydrocannabinol'.	As narcotic and intoxicant
SAFFRON OR 'Kesar'	Crocus sativus	Iridaceae	Styles and stigma are used.	As stimulant nerve sedative and diuretic.

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C.N.	B.N.	F.	PART(S) USED	USES
MALABAR NUT OR 'Vasaka'	Adhatoda vesica	Acanthaceae	Leaves contain alkaloid 'vascine'.	In the treatment of bronchitis & asthma; also in diarrhoea and malaria.
ALOE OR "Ghrit Kumari"	Aloe barbadensis	Liliaceae	Succulent leaves.	In gonorrhoea, skin diseases & diseases of liver and spleen.
BELLADONNA	Atropa belladonna	Solanaceae	Leaves and roots contain alkaloids like 'atropine' & 'hyoscyamine'.	In plasters and tinctures to relieve pain. It dialates pupil, cures asthma and is antidote for poisoning.

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C.N.	B.N.	F.	PART(s) USED	USES
INDIAN PENNYWORT OR 'Brahmi'	Centella asiatica	Apiaceae	Leaves.	As diuretic and in chronic - eczema, rheuma -tism, madness & Cholera.
'DHATURA'	Datura stramonium	Solanaceae	Leaves contain alkaloids like 'atropine', 'hyoscy -amine', 'scopolamine' etc.	In relaxing bronchial muscles and treating astha
'TILPUSHPI'	Digitalis purpurea	Scrophulariaceae	Leaves contain a glucoside, 'digit -oxin'.	In stimulating cardiac muscle
'COCAINE'	Erythroxylum coca	Erythroxylaceae	Leaves contain an alkaloid 'cocaine'.	Used as a local anaesthetic and a tonic for digestive and nervous system

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C.N.	B.N.	F.	PART(S) USED	USES
'HENBANE' OR 'Khurasani Ajwain'	Hyoscyamus niger	Solanaceae	Leaves contain poisonous alkaloids like hyoscyamine and scopolamine.	Used as sedative and hypotonic.
'MARUA'	Majorana hortensis	Lamiaceae	Leaves.	Used as stimulant and carminative.
MINT	Mentha sp.	Lamiaceae	Leaves yield menthol.	Used in the treatment of cold.
BASIL OR 'Tulsi'	Ocimum sp.	Lamiaceae	Leaves	Used in cough, fever, seminal weakness.
THYME	Thymus vulgaris	Lamiaceae	Leaves contain an essential oil derivative, 'thymol'.	In toothpaste, mouthwash. It is effective against hookworm

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C.N.	B.N.	F.	PART(S) USED	USES
'WORM WOOD'	Artemisia absinthium	Asteraceae	oil is obtained from the leaves.	Acts as a purgative.
'MARGOSA' or 'Neem'	Azadirachta indica	Meliaceae	Leaves contain 'azadirachtin'.	Acts as an insecticide.
	Cassia angustifolia	Caesalpiniaceae	Leaves.	As laxative and purgative
'PAAN'	Piper betle	Piperaceae	Leaves	As carminative, astringent, stimulant and expectorant.

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C.N.	B. N.	F	PART(S) USED	USES
'RASAUT'	Berberis aristata	Berberidaceae	Bark of the roots.	In treatment of eye troubles
'SAFED MOOSLI'	Asparagus adescendens	Liliaceae	Roots are used.	In diarrhoea and dysentery.
'SARSAPARILLA'	Smilax zeylanica	Liliaceae	Roots.	Skin, veneral diseases and rheumatism

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GUMS AND RESINS:

Gums are colloidal in nature, soluble in water, sweet in taste, formed as a result of gummosis of internal tissues involving the decomposition of cellulose. They are close allies of pectin and are naturally exuded when plants are wounded.

Resins are the oxidation products of essential oils. They are secreted in specefic canals or cavities. They show hardening on contact with air and possess antiseptic qualities and, thus, prevent decay. They are soluble in water but insoluble in organic solvents. They, being soluble in alkalies form soaps.

They are categorised as follows:

(I) **HARD RESINS:** They have little amount of essential oils, hence, are solid at room temperature.
eg: Damars, copals, ambers, shellac, sandrac, lacquer etc.

(II) **OLEORESINS:** Liquid at room temperature.
eg: turpentines, balsams etc.

(III) **GUM RESINS:** Mixture of true gums and resins, exuded as a milky substance.
eg: Asafoetida, Myrrh and Opoponax etc.

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TANNINS & LATEX PRODUCTS :

Tannins are complex organic compounds generally glucosidal in nature and medicinally strong astringents.

e.g. Canaigre, Quebracho, Gumghatti, Sumac, Harara, Bahera etc.

Latex is a milky white or coloured gummy emulsion (containing acids, salts sugars, oils, resins proteins and hydrocarbons) in water. It contains a special substance caoutchouc which is used as a source of rubber. It is secreted in special cells or vessels.

e.g. products of latex include rubber, guttapercha, chicle, balata etc.

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GUMS

COMMON NAME	BOTANICAL NAME	FAMILY
GUM ARABICA	Acacia arabica	Mimosaceae
KORDOFAN GUM	A. senegal	"
BABUL-KI-GOND'	A. nilotica	"
MOCHARAS	Bombax malabaricum	Bombacaceae
PALAS-KI-GOND	Butea monosperma	Fabaceae
FERONIA-GUM	Feronia limonia	Rutaceae
GUM KINO	Pterocarpus marsupium	Fabaceae
Hattia-Ki-Gond	Ceiba pentandra	Bombacaceae
GUM GHATTI	Anogeissus latifolia	Combretaceae
COWA	Garcinia cowa	Clusiaceae
MESQUITE GUM	Prosopis sp.	Mimosaceae
Benzoin	Styrax benzoin	Styracaceae

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C.N.	B.N.	F.	COMMENTS
GUM TRAGACANTH	Astragalus gummifera	Papilionaceae	
'Katira gum'	Sterculia urens	Sterculiaceae	
RESINS			
HARD RESINS			
'Damars'	Vateria indica	Dipterocarpaceae	White damar
	Balanocarpus heimii	"	Penak damar
	Shorea hypochra	"	Temak damar
	Canarium strictum	Burseraceae.	Black damar
'Copals'	Agathis australis	Araucariaceae	Kauri copal
	A. alba	"	Manila Copal
'Amber'	Pinites succinifera	Pinaceae	
'Shellac'	Tacharadia lecca (INSECT)		on plants like Acacia nilotica, Butea monosperma Ficus religiosa etc.

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C.N.	B.N.	F.		
Sandrac	Callitris quadrivalis	Cupressaceae		
Lacquer	Rhus succelanea	Anacardiaceae		
LEO-RESINS				
Turpentines	Pinus australis	Pinaceae		
Canada Balsam	Abies balsamea	"		
Spruce gum	Picea rubens	"		
Rosin	Pinus roxuburghi	"		
Tar	P. longifolia	"		
UM RESINS				
Canaboge	Garcinia morella	Clusiaceae		
Salai Guggul	Boswellia serrata	Burseraceae		
Myrrh	Commiphora myrrha	"		

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C.N.	B.N.	F.		
Asafoetida	Ferula asafoetida	Apiaceae		
Opopanax	Opopanax cleronium	/ "		
TANNINS				
'Canaigre'	Rumex hymenosepalous	Polygonaceae		
Chestnut	Castanea dentata	Fagaceae		
Quebracho	Schinopsis lorentzii	Anacardiaceae		
Sumac	Rhus sp.	"		
Gambier	Uncaria gambier	Rubiaceae		
Divi-divi	Caesalpinia coriaria	Caesalpiniaceae		
'Bahera'	Terminalia bellerica	Combretaceae		
'Harara'	T. chebula	"		

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LATEX PRODUCTS:

COMMON NAME	BOTANICAL NAME	FAMILY	COMMENTS	
HEVEA RUBBER	Hevea brasiliensis	Euphorbiaceae		
CASTILLA RUBBER	Castilla elastica	Moraceae		
INDIAN RUBBER	Ficus elastica	"		
Dandelion Rubber	Taraxacum kok-saghyz	-Asteraceae		
Ceara Rubber	Manihot glazoivii	Euphorbeaceae		
Gutta-percha	Palaquim gutta	Sapotaceae	Non-elastic rubber	Used in insulat & telephone receive
Chicle	Achras sapota	"	Used in 'Chewing-gums'	
Balata	Malinkara bidentata	"	Non-elastic ruber used as substitute of gutta percha.	

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INSECTICIDES, DYES, NARCOTICS, FUMITORIES & MASTICATORIES AND WAXES.

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INSECTICIDES OF PLANT ORIGIN

COMMON NAME	BOTANICAL NAME	FAMILY	PART(S) USED
PYRETHRUM	Chrysanthemum sp. C. cinerariifolium C. coccinium	Asteraceae	Unopened flowerbuds.
ROTENONE	Lonchocarpus sp. Derris elliptica	Leguminosae	Root Root
Cockroach Plant	Haplophyton cimicidum	Apocynaceae	Dried leaves
Custard Apple	Anona squamosa	Anonaceae	Seeds.
Anabasis	Anabasis aphylla	Chenopodiaceae	leaves and stem.
Indigobush	Amorpha fruticosa	Leguminosae	Fruits.
Margosa	Azadirachta indica	Meliaceae	leaves & fruits.
Nicotine	Nicotiana tabacum	Solanaceae	leaves.

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DYES

COMMON NAME	BOTANICAL NAME	FAMILY	PART(S) USED	USES
MADDER	Rubia sp.	Rubiaceae	Roots	A red dye is obtained.
Barbery	Berberis aristata	Berberidaceae	Roots	A yellow dye.
TURMERIC	Curcuma Longa	Zingiberaceae	Rhizomes	A Yellow dye.
Lakao	Rhamnus globosa	Rhamnaceae	Bark	A green dye.
QUERCITRON	Quercus velutina	Fagaceae	Bark	Bright yellow dye
TEAK	Tectona grandis	Verbenaceae	Bark	Yellow dye
INDIGO OR 'Mehndi'	Indigofera tinctoria	Papilionaceae	Leaves	A Blue dye.
HENNA OR 'Mehndi'	Lawsonia inermis	Lythraceae	Leaves	Orange dye
FLAME OF FOREST OR 'Tesu'	Butea monosperma	Papilionaceae	Flowers	Orange-yellow dye
SAFFLOWER	Carthamus tinctorius	Asteraceae	Flowers	Yellow dye.

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C.N.	B.N.	F.	PART(S) USED	USES
SAFFRON OR 'Kesar'	Crocus sativus	Iridaceae	Style and stigma	Yellow dye.
'Harsingar'	Nyctanthes arbortristis	Oleaceae	Flowers	Orange dye.
RED CEDAR 'Tun'	Toona ciliata	Meliaceae	Flowers	Yellow-red dye.
'Meetha Indrayon'	Wrightia tinctoria	Apocynaceae	Flower	Blue dye.
SAP.GREEN	Rhamnus cathartica	Rhamnaceae	Fruit	Green dye.
ANNATTO	Bixa orellana	Bixaceae	Aril	Yellow
'GAMBOSE'	Garcinia morella G. cowa	Clusiaceae	Gum resin obtained from different parts.	Yellow dye.
LOG-WOOD	Haematoxylon campechianum	Caesalpiniaceae	Heartwood	Purple red dye
RED-SANDLE WOOD	Pterocarpus santalinus	Papilionaceae.	wood	
WOAD.	Isatis tinctoria	Brassicaceae	Leaves	Indigo colour.

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NARCOTICS

COMMON NAME	BOTANICAL NAME	FAMILY	PART(S) USED
THORN APPLE or 'JIMSON WEED'	Datura stramonium	Solanaceae	Seeds
COLA	Cola nitida	Sterculiaceae	Seeds or nuts
COCAINE	Erythroxylum coca	Erythroxylaceae	Leaves.
Tobacco	Nicotiana tabacum and other species.	Solanaceae	"
BETEL NUTPALM	Areca catechu	Arecaceae	Fruit
INDIAN HEMP	Cannabis sativa	Cannabinaceae	Leaves and female flowers

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FUMITORIES & MASTICATORIES

COMMON NAME	BOTANICAL NAME	FAMILY	PART(S) USED	USES
ARECA NUT OR 'Supari'	Areca catechu	Arecaceae	Drupes with fibrous mesocarp are produced.	Ruminate Endosp is masticatory
'Bhang' OR MARIJUANA	Cannabis sativa	Cannabinaceae	Leaves and young twigs are dried.	The preparation is mixed with Cold drinks.
'Ganja'	"	"	Dried female flowers.	It is smoked.
'Charas' OR 'Hashish'	"	"	Yellowish resin from female flowers.	Smoked.
TOBACCO OR 'Tambaku'	Nicotiana tabacum	Solanaceae	Leaves contain an alkaloid 'nicotine' which is narcotic.	Chewed and smoked.
Opium Poppy OR 'Afeem'	Papaver somniferum	Papaveraceae	Latex exudate from unripe fruits contains alkaloids like 'morphine' and 'codeine'.	A habit formi drug which depresses the ce nervous system
BETEL OR 'Paan'	Piper betle	Piperaceae	Fresh or bleached leaves.	Chewed with cat and hydrated li

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C.N.	B.N.	F.	PART(S) USED	USES
COLA	Cola nitida	Sterculiaceae	Nuts contain 'caffeine' and 'kolanin'.	They lessen hunger and fatigue.
THORN APPLE OR 'Dhatoora'	Datura stramonium	Solanaceae	Seeds contain an alkaloid scopolamine.	It is a hallucinogen.
COCA	Erythroxylon coca	Erythroxylaceae	Leaves contain an alkaloid 'cocaine'.	Reduces fatigue
HENBANE Khurasani Ajwain'	Hyoscyamus niger	Solanaceae	Leaves and flower twigs yield the drug 'henbane'.	Its leaves are smoked.

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WAXES.

COMMON NAME	BOTANICAL NAME	FAMILY	PART(S) USED.
CAUASSU WAX	Calathea lutea	Marantaceae	leaves.
CERA WAX	Ceroxylon andicola	Arecaceae	Stem.
CARNAUBA WAX	Copernicea cerifera	"	leaves
Jojoba wax	Simmondsia sinensis	Buxaceae	Seeds
Myrtle wax	Mysica cerifera	Myricaceae	Fruits
Candelilla wax	Euphorbia antisphilitica	Euphorbiaceae	stems

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